Nags Head Shoreline Management Committee Meeting

High Value Services
Sustainable Solutions

COASTAL SCIENCE & ENGINEERING

9 August 2016

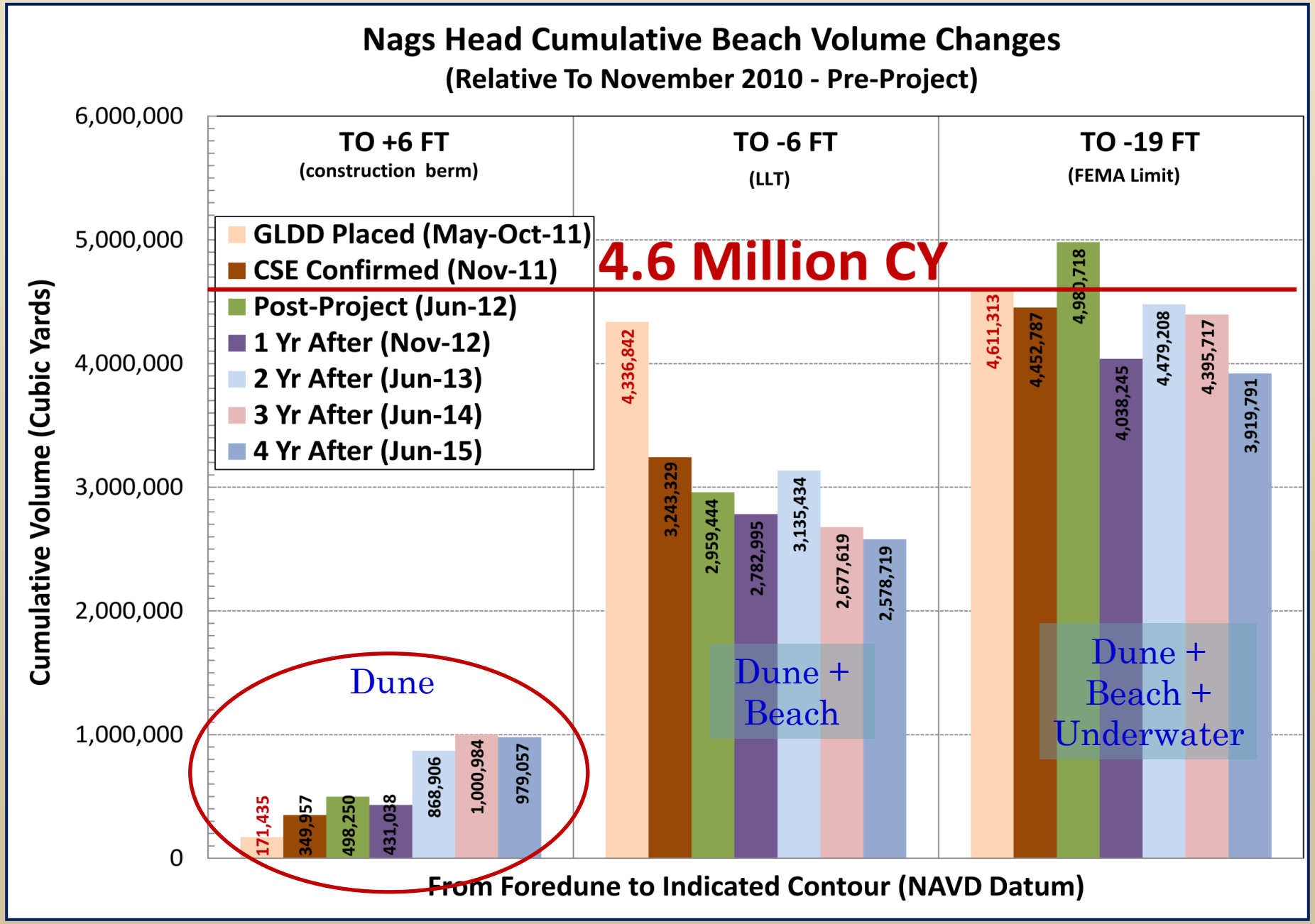
Project Schedule for 2018 Re-Nourishment

2016		
Month 1	May	Initiate work
Mon 2–5	Jun-Sept	(1) Define the ideal (target) beach condition (2) Conduct borrow area survey & obtain borings (3) Develop renourishment requirements, dune stabilization alternatives, and initiate engineering studies
Mon 6-8	Oct-Dec	Design, cost estimates, field work, initiate permit liaison
2017		
Mon 9–13	Jan-May	(1) Prepare supporting environmental documents (2) Complete preliminary design (3) Pre-application meetings with regulatory & resource agencies
Mon 14	Jun	Submit permit applications with supporting documents
Mon 15–20	Jul-Dec	Permit liaison to secure permits in time
2018		
Mon 21–24	Jan-Apr	Receive permits / prepare plans and specifications, request bids, receive bids, select contractor, construction preparation
Mon 25–28	May-Aug	Construction and construction administration

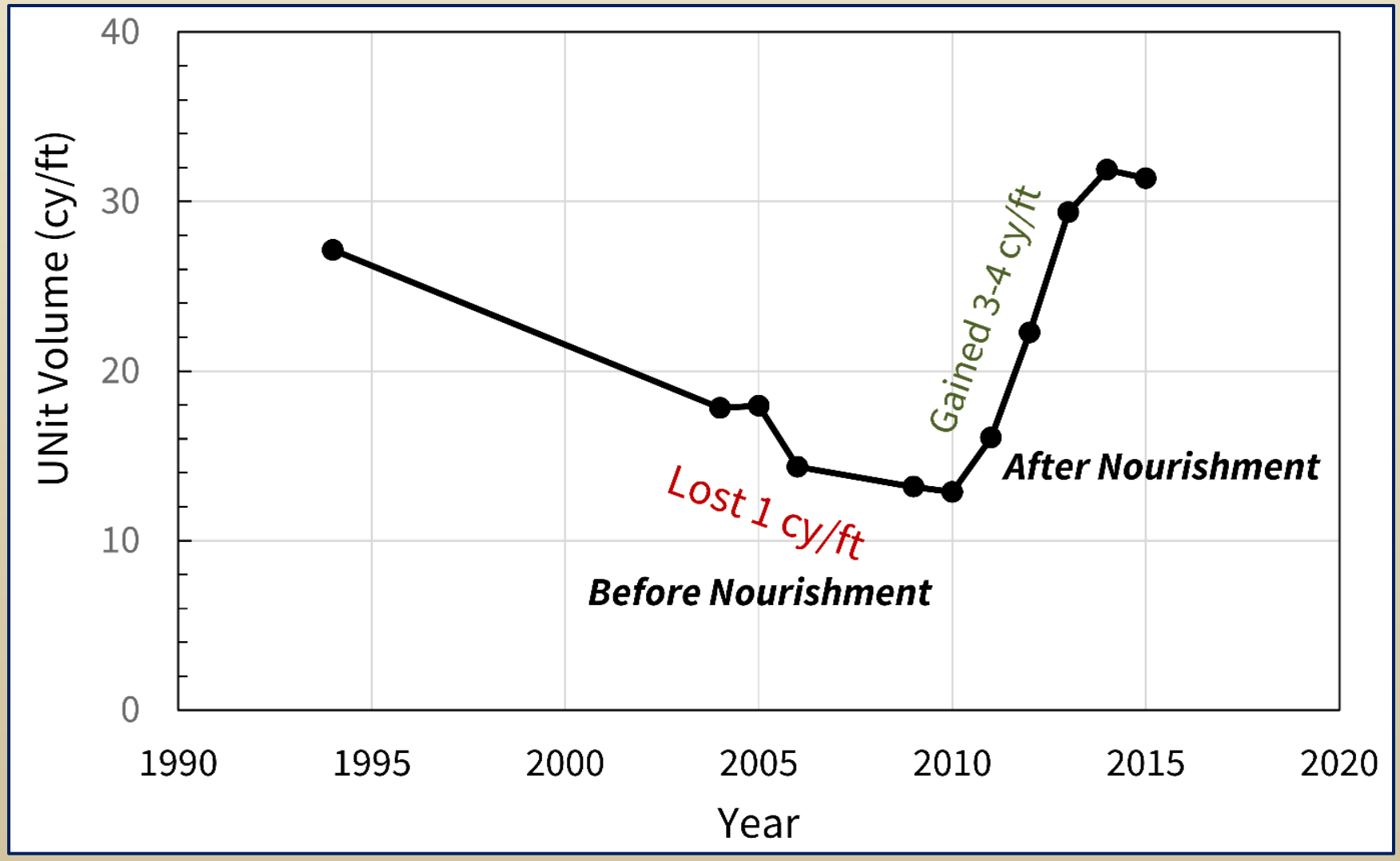
Goal – To Define A “Target” Beach Condition for the 2018 Renourishment and the Future

- Provide higher level of storm protection
- Provide wider recreational beach
- Replenish sand deficit in the “sand box”

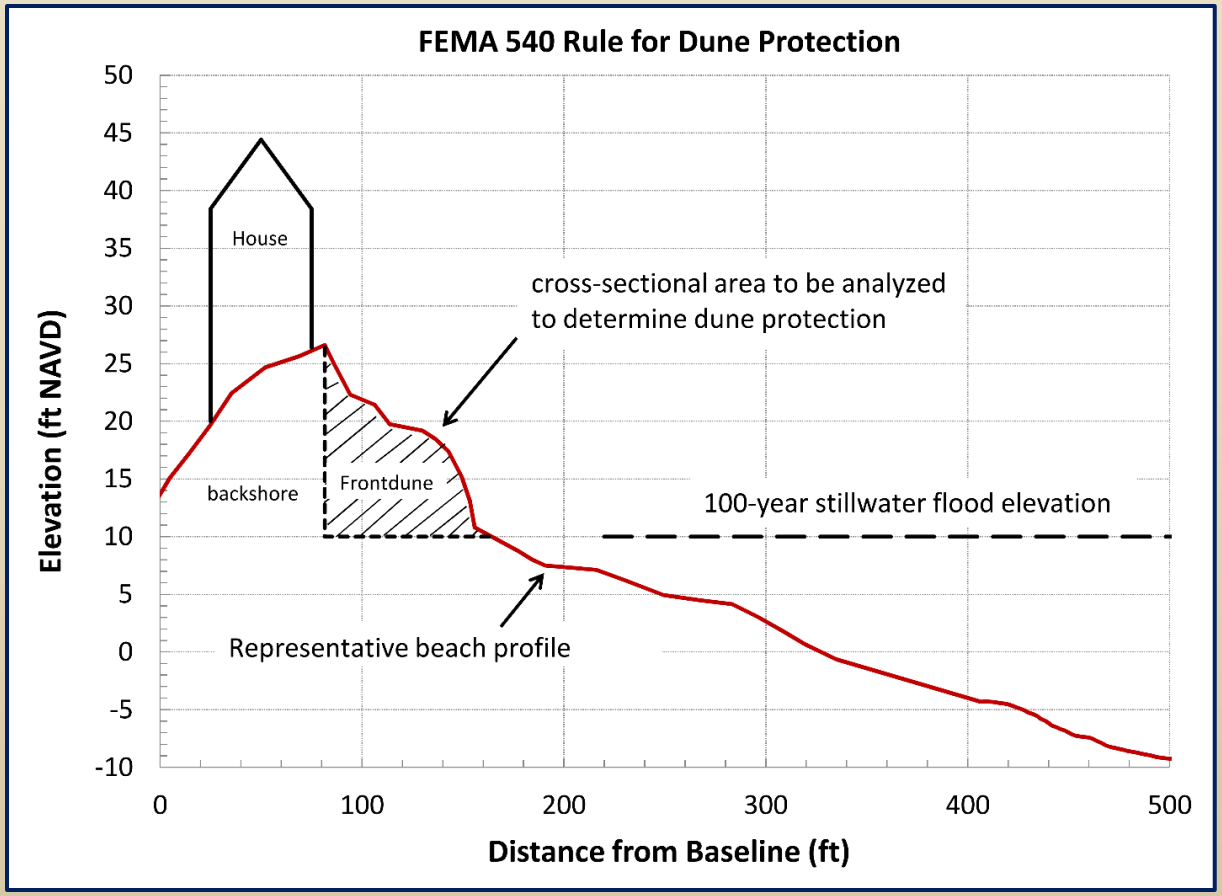
Project Performance – Volume Changes



Dune Growth/Loss Rates Before/After Nourishment

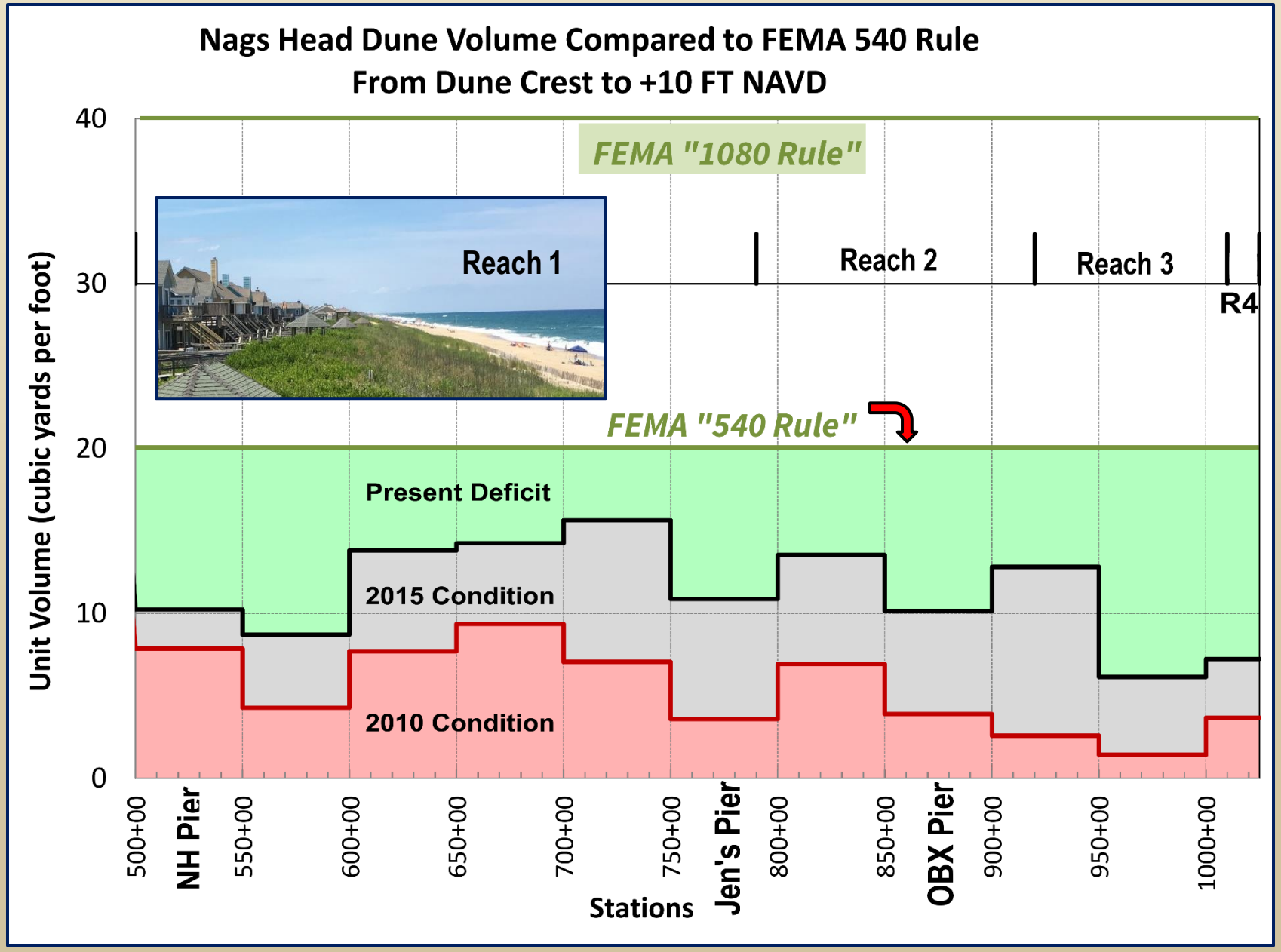


FEMA 540 Rule for Dune Protection

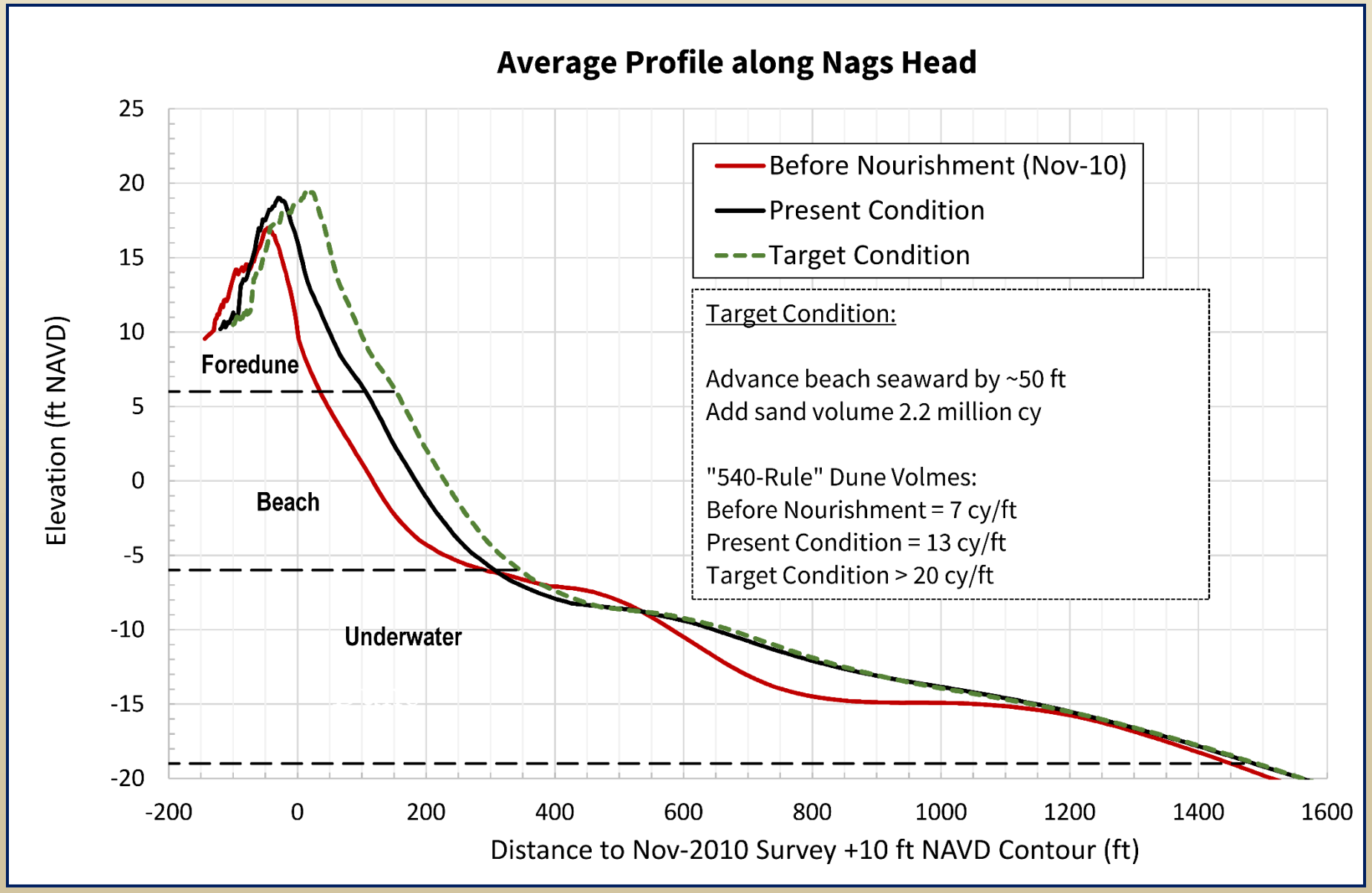


"Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet (20 cubic yards per foot)." ***[FEMA 53 FR 16279, May 6, 1988]***

Nags Head "540 Rule" Volume Before/After 2011 Project

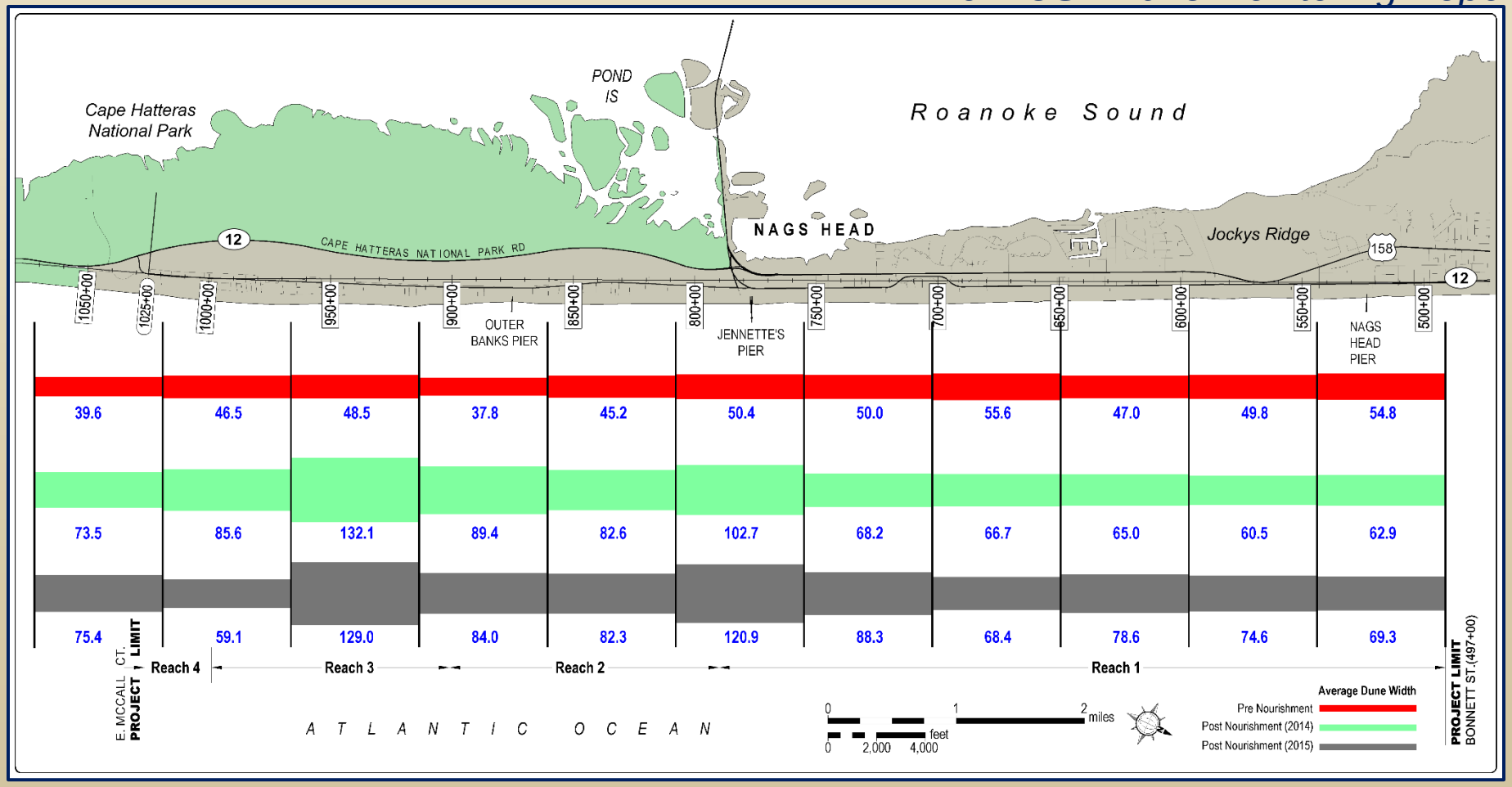


Average Profile Analysis

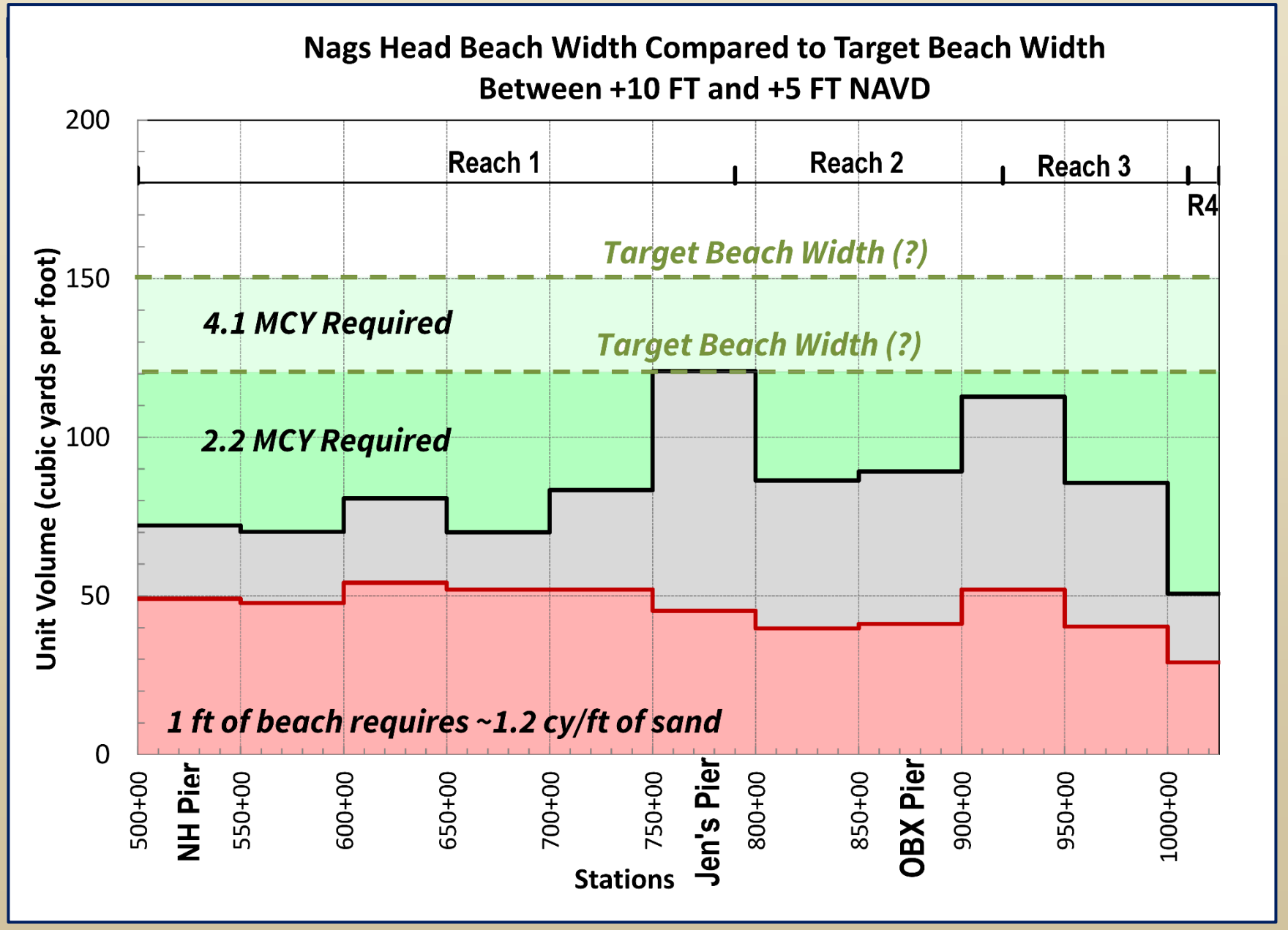


Nags Head Beach Width Before/After 2011 Project

From CSE 2015 Monitoring Report



1-Mile Average Beach Width Before/After 2011



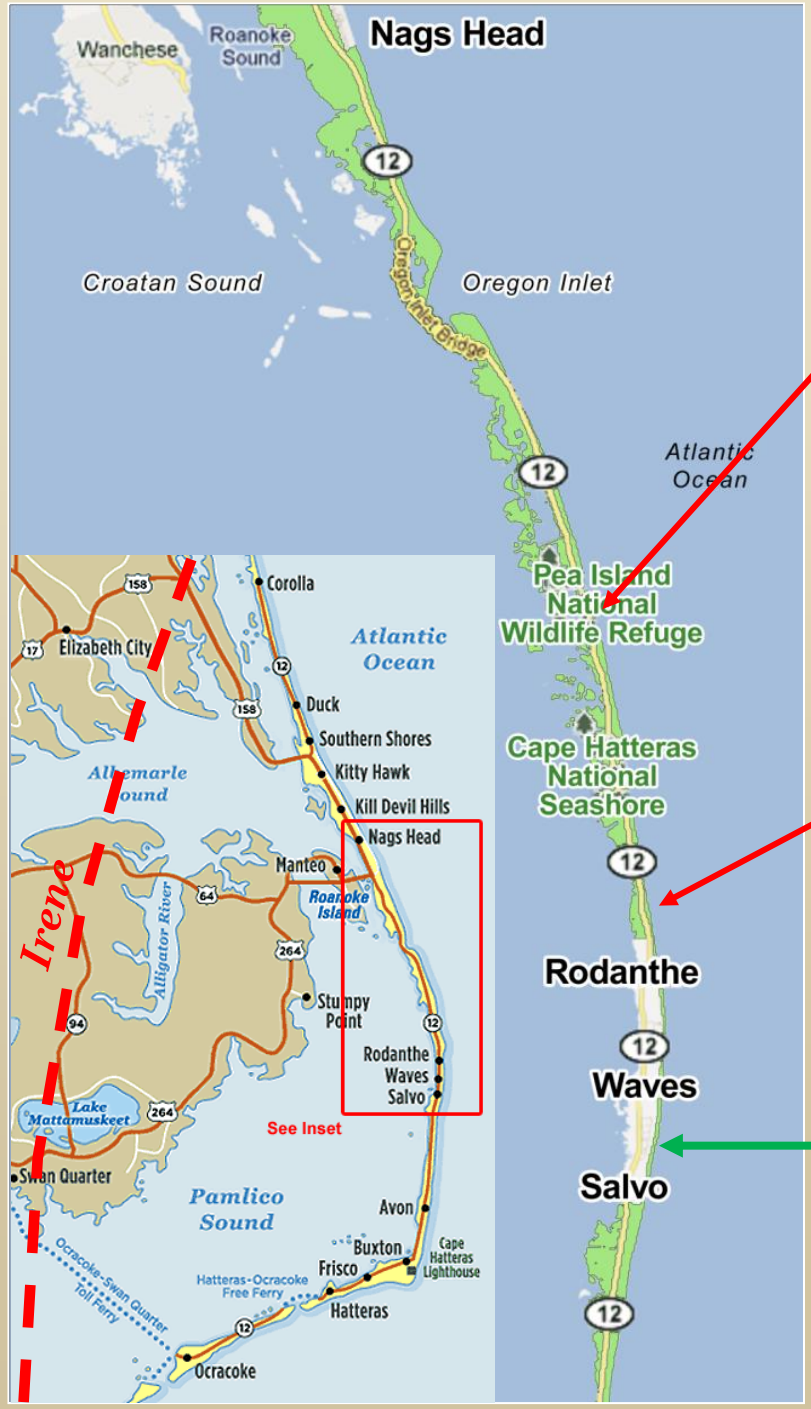
Dune Growth After Nourishment

Incipient Dune &
Established Dune

Hurricanes and Storms in Outer Banks (2000 – Present)

- Florence – 12 September 2000
- Isabel – 18 September 2003
- Dennis – 11 July 2005
- Katrina – 30 August 2005
- Ophelia – 14 September 2005
- Irene – 27 August 2011
- Sandy – 26 October 2012
- Arthur – 3-4 July 2014
- Joaquin – 3 October 2015
- Bonnie – 30 May 2016

Hurricane *Isabel* (18 September 2003)


Nags Head
Wanchese
Roanoke Sound
Croatan Sound
Oregon Inlet
Oregon Inlet Bridge
Atlantic Ocean
Pea Island National Wildlife Refuge
Cape Hatteras National Seashore
Rodanthe
Waves
Salvo
12
Corolla
Elizabeth City
Duck
Southern Shores
Kitty Hawk
Kill Devil Hills
Nags Head
Manteo
Roanoke Island
Albemarle Sound
Alligator River
Irene
Stumpy Point
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Waves
Salvo
See Inset
Lake Mattamuskeet
Swan Quarter
Pamlico Sound
Avon
Buxton
Frisco
Hatteras
Cape Hatteras Lighthouse
Hatteras-Ocracoke Free Ferry
Ocracoke-Swan Quarter Toll Ferry
Ocracoke
158
17
64
264
94


Post-*IRENE* (2 Sep 2011)


~400 ft

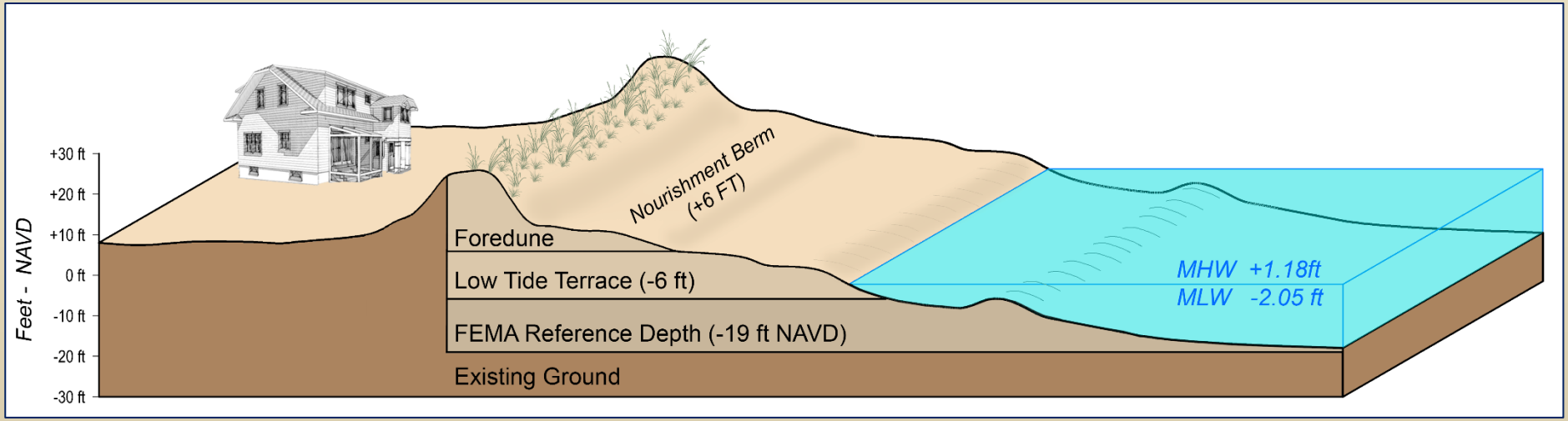
Discussion

- Project scale
- Formulation
- Strategic borrow area(s)
- Permitting

- Storm protection level
- Beach width
- Short term vs. long term
- Dune enhancement

?

Beach Condition Analysis – *"The Littoral Sand Box"*



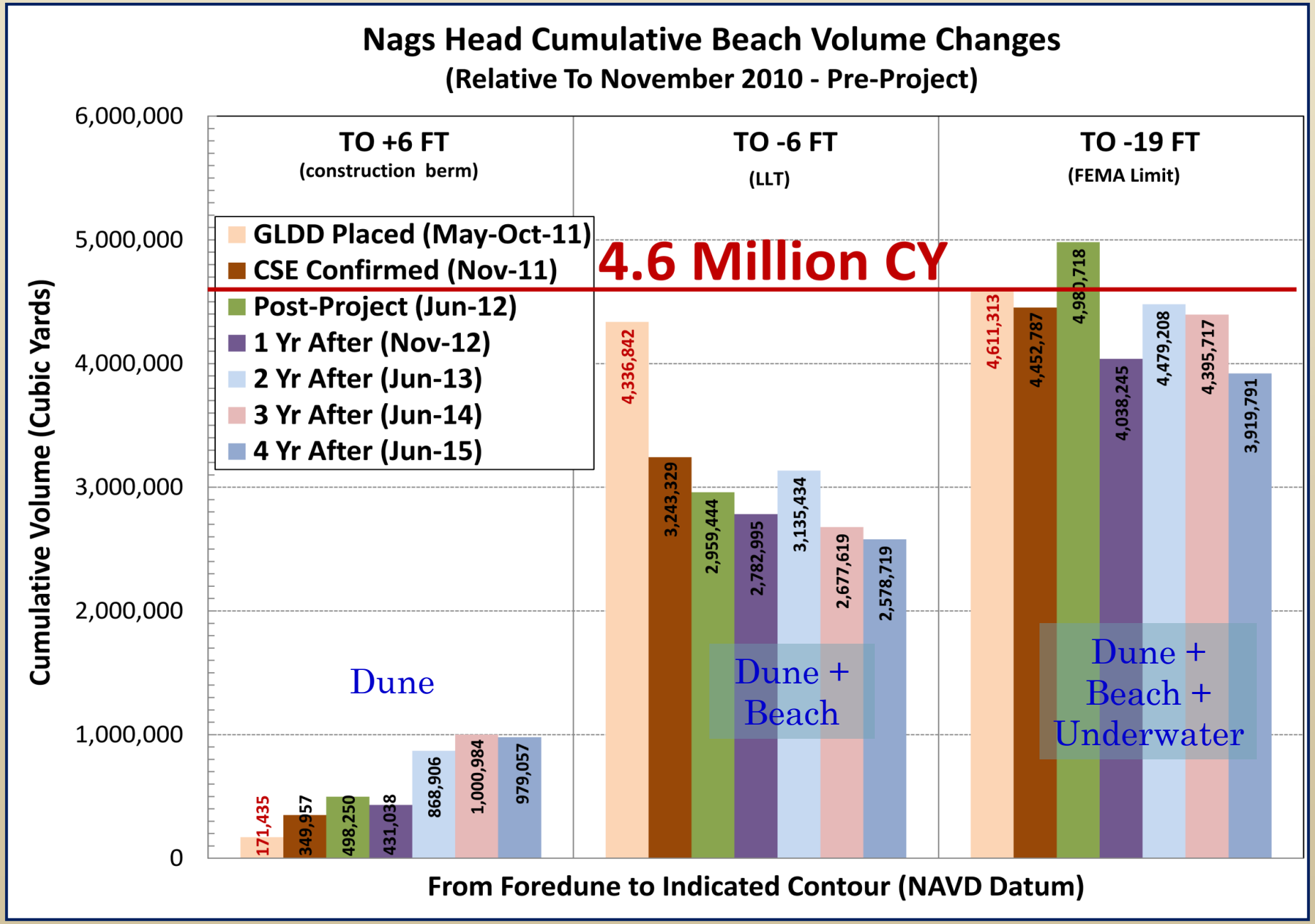
Lens 1 – ***Foredune*** – From the ~crest of dune to +6 ft NAVD*

Lens 2 – ***Beach*** – Between +6 ft and -6 ft NAVD

Lens 3 – ***Underwater*** – Between -6 ft and -19 ft NAVD

**NAVD-North American Vertical Datum of 1988 = ~mean sea level*

Project Performance – Volume Changes



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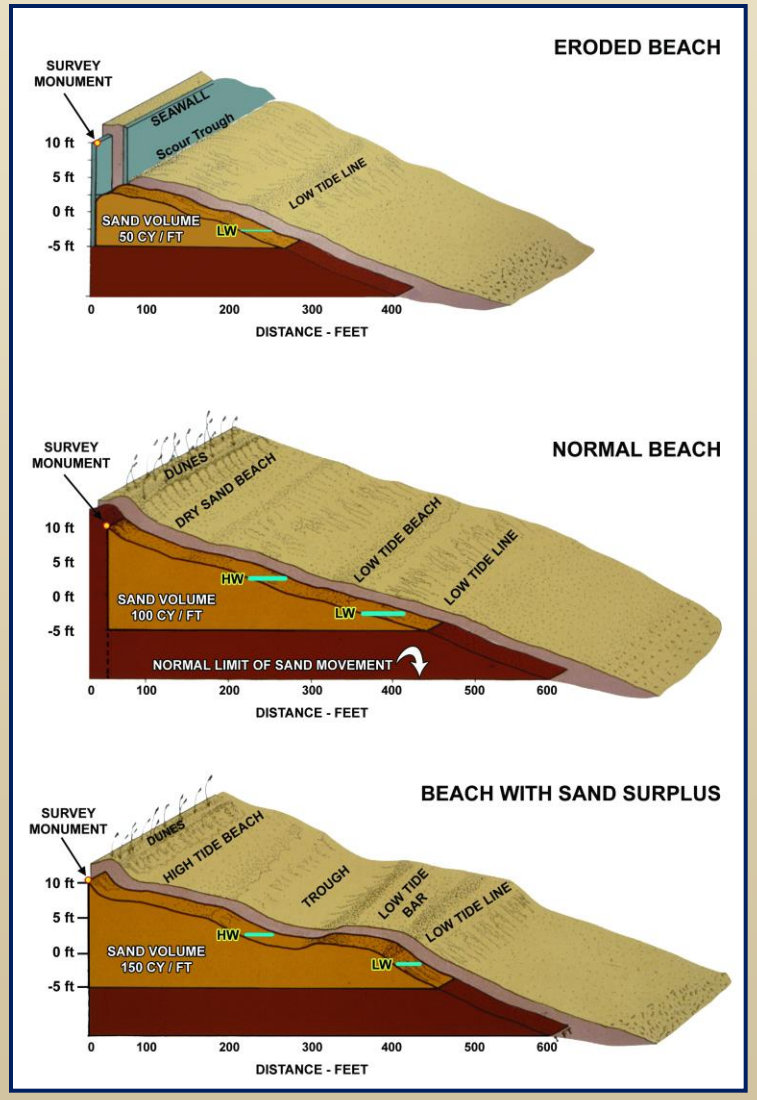

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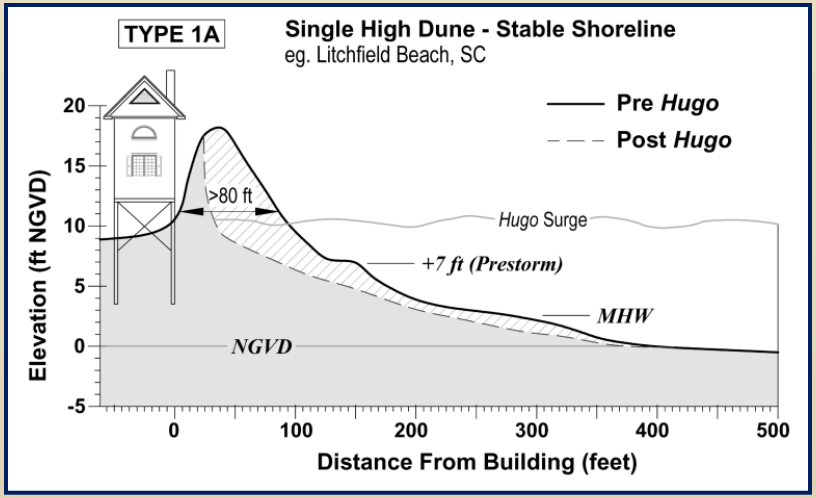
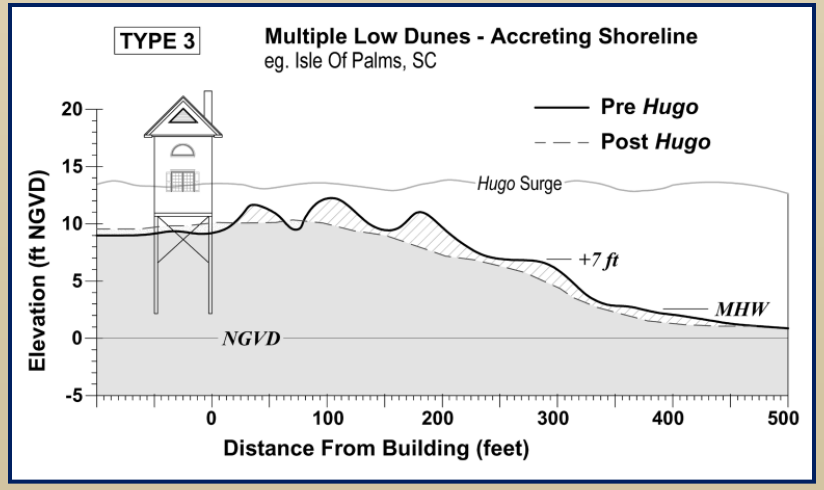
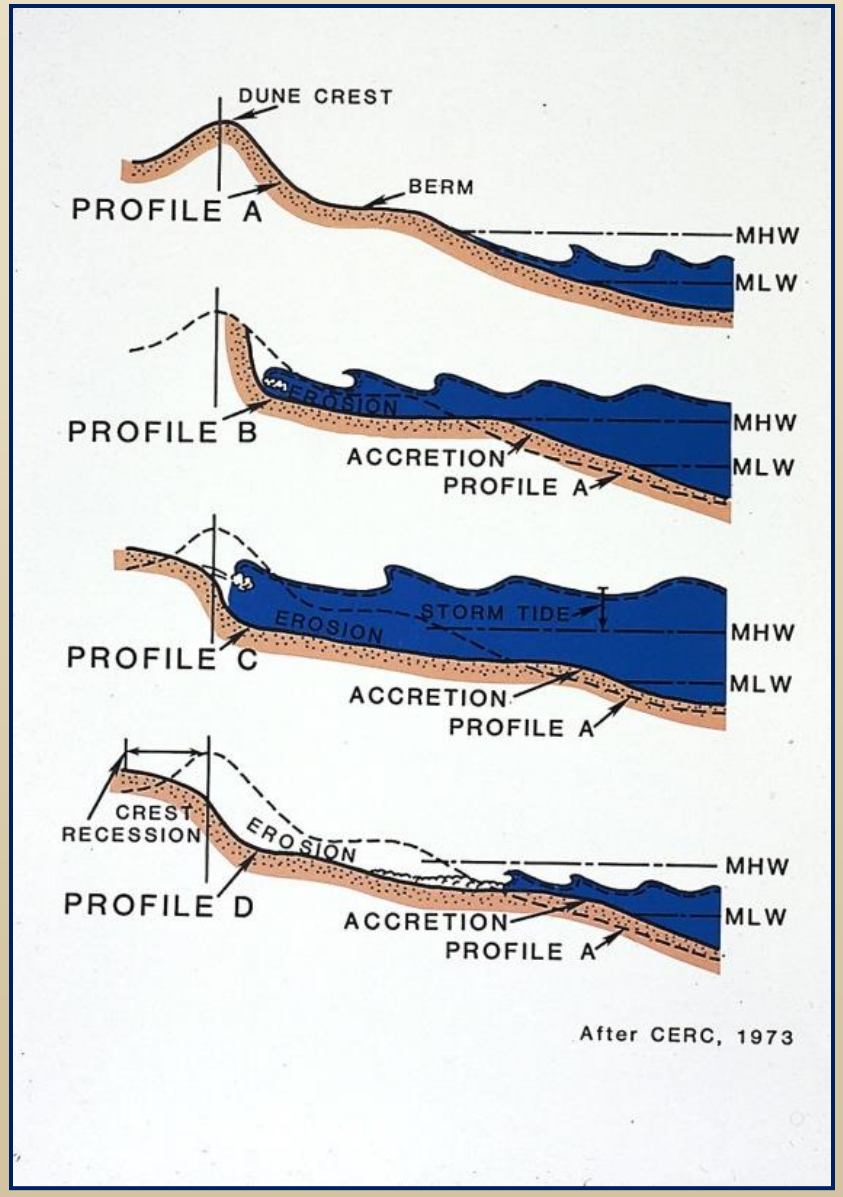


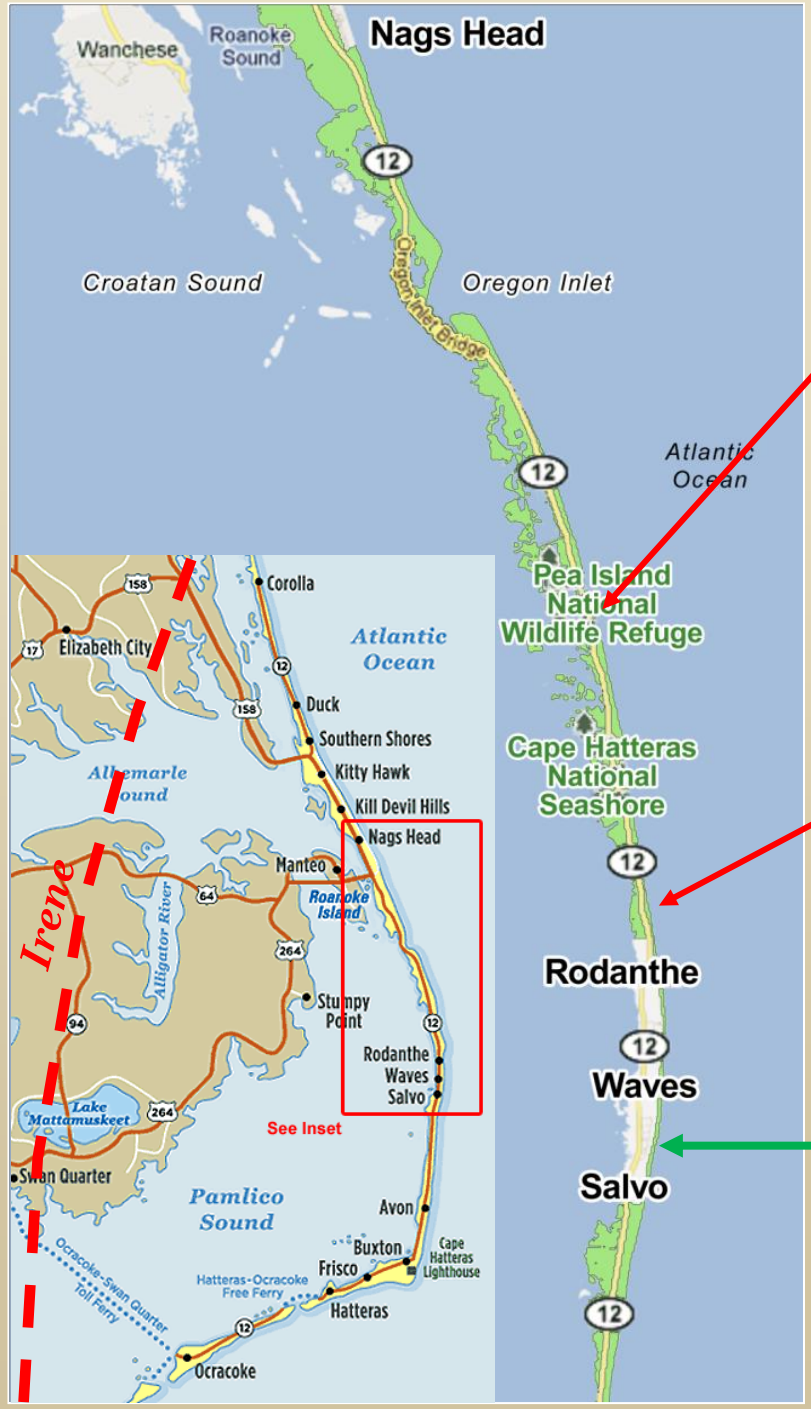




Formula for Sustainable Developed Coasts

High Dunes
+ Wide
Beaches
= Less
Damage

Resource: www.asbpa.org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See Inset
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Post-*IRENE* (2 Sep 2011)


~400 ft

At Nags Head – *Post 2011 Project*

Wide Beaches → Growing dunes

Wide Beaches → Lower wave run-up in storms

Wide Beaches → Fewer washovers at street ends

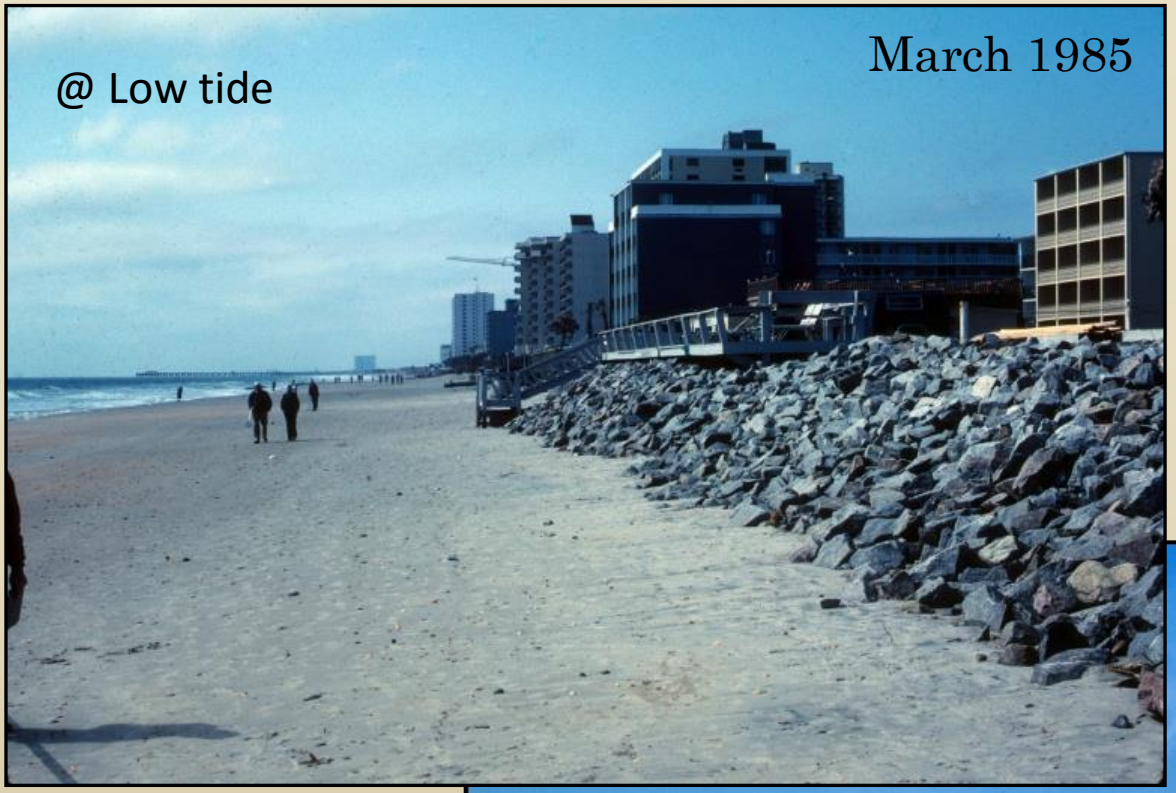
→

Wide Beaches → Lower public maintenance costs

→

Wide Beaches → Higher property values/tax base

Myrtle Beach 30-yr Improvement

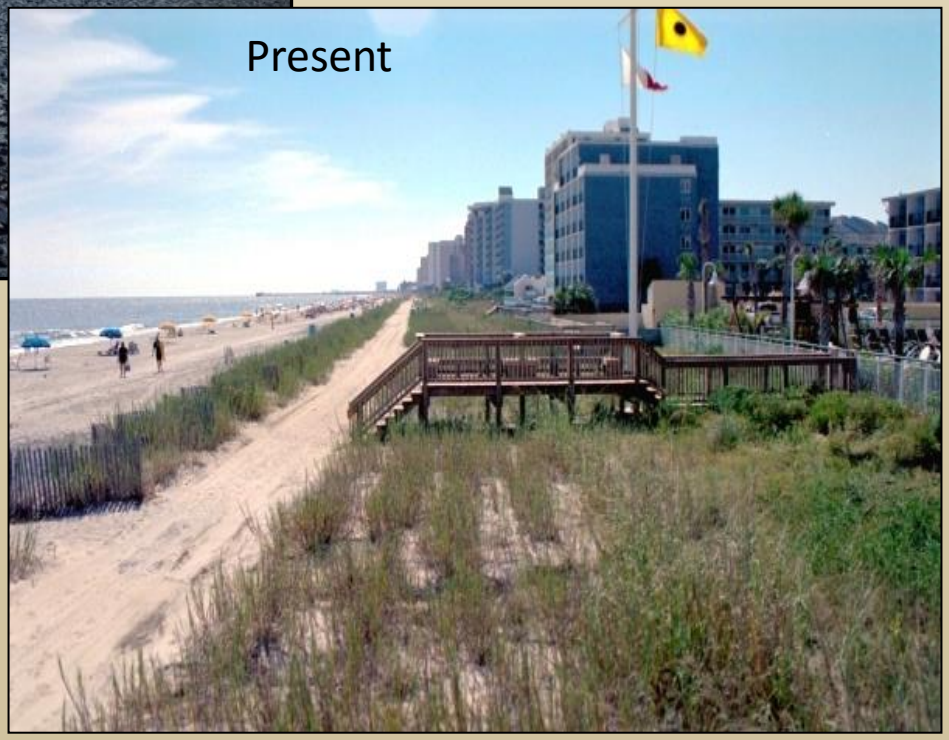


1st Locally Sponsored Nourishment In SC

Myrtle Beach – 30 yrs later

Four Nourishment Events – 1986 to Present

Federal Project 1997 - 2047

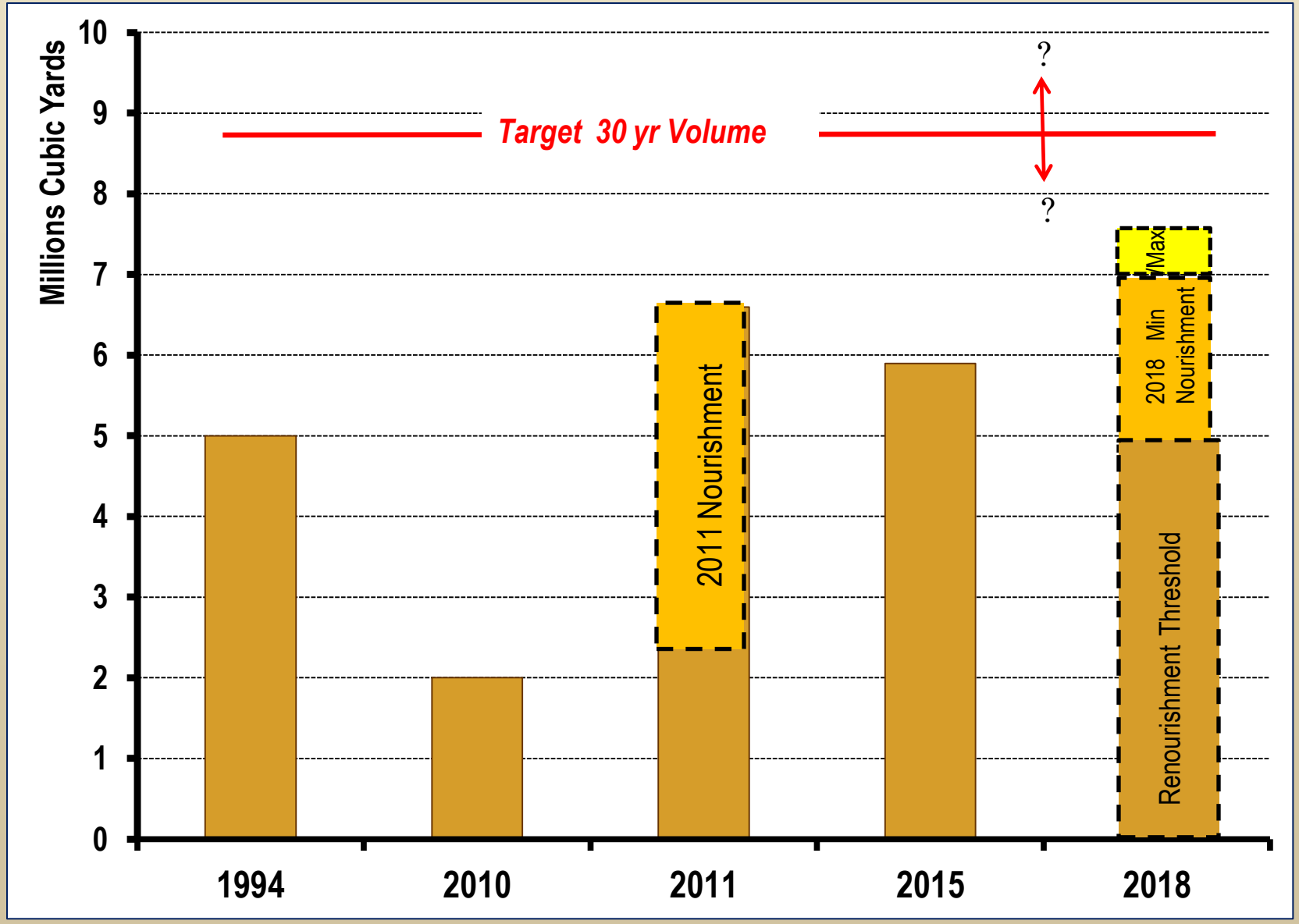


- Seawalls Buried
- Protective Storm Berm
- 100 ft Wider Beach
- 100 Acres Beach habitat gained

Part 2 – Target Beach Condition

- Storm damage protection
- Recreational beach width
- Sand deficit in the “sand box” to a target condition

Nags Head Sand Volume in the System



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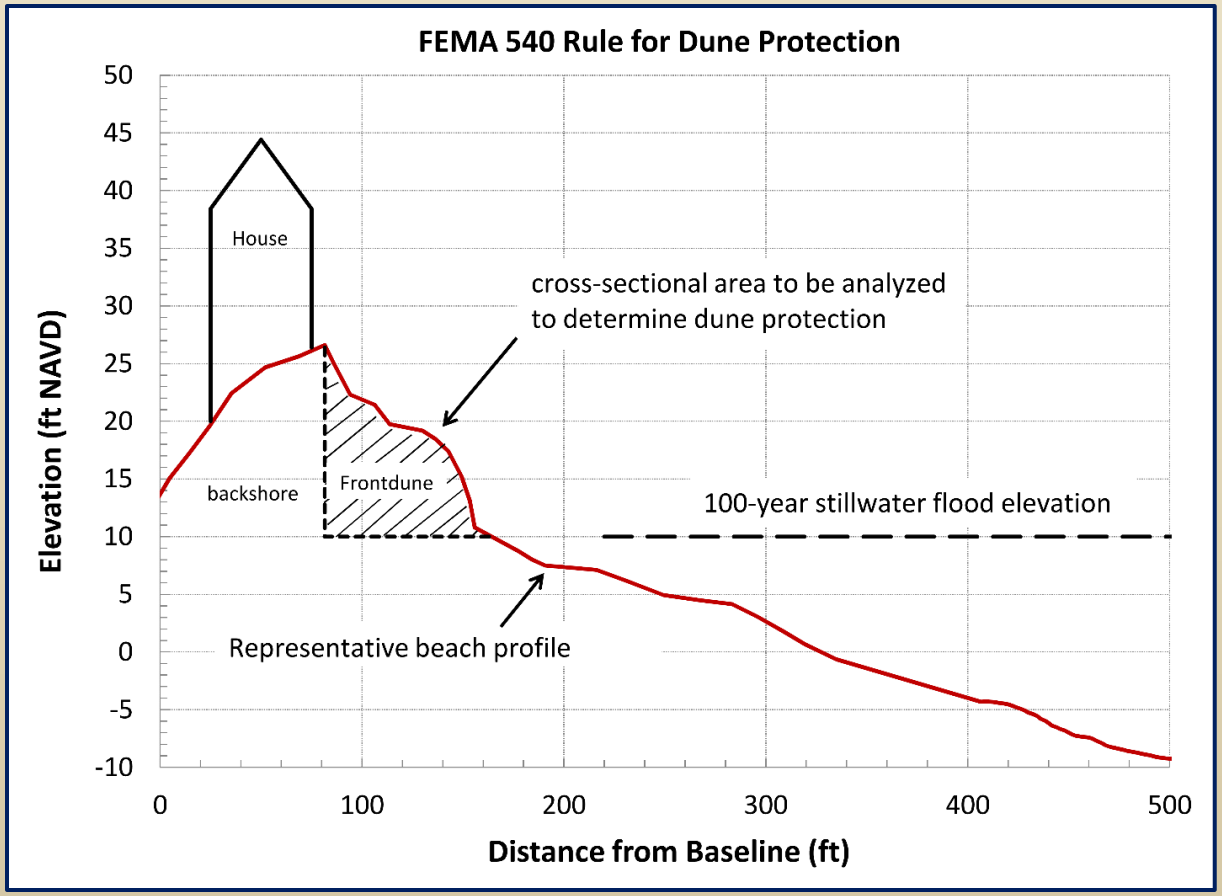

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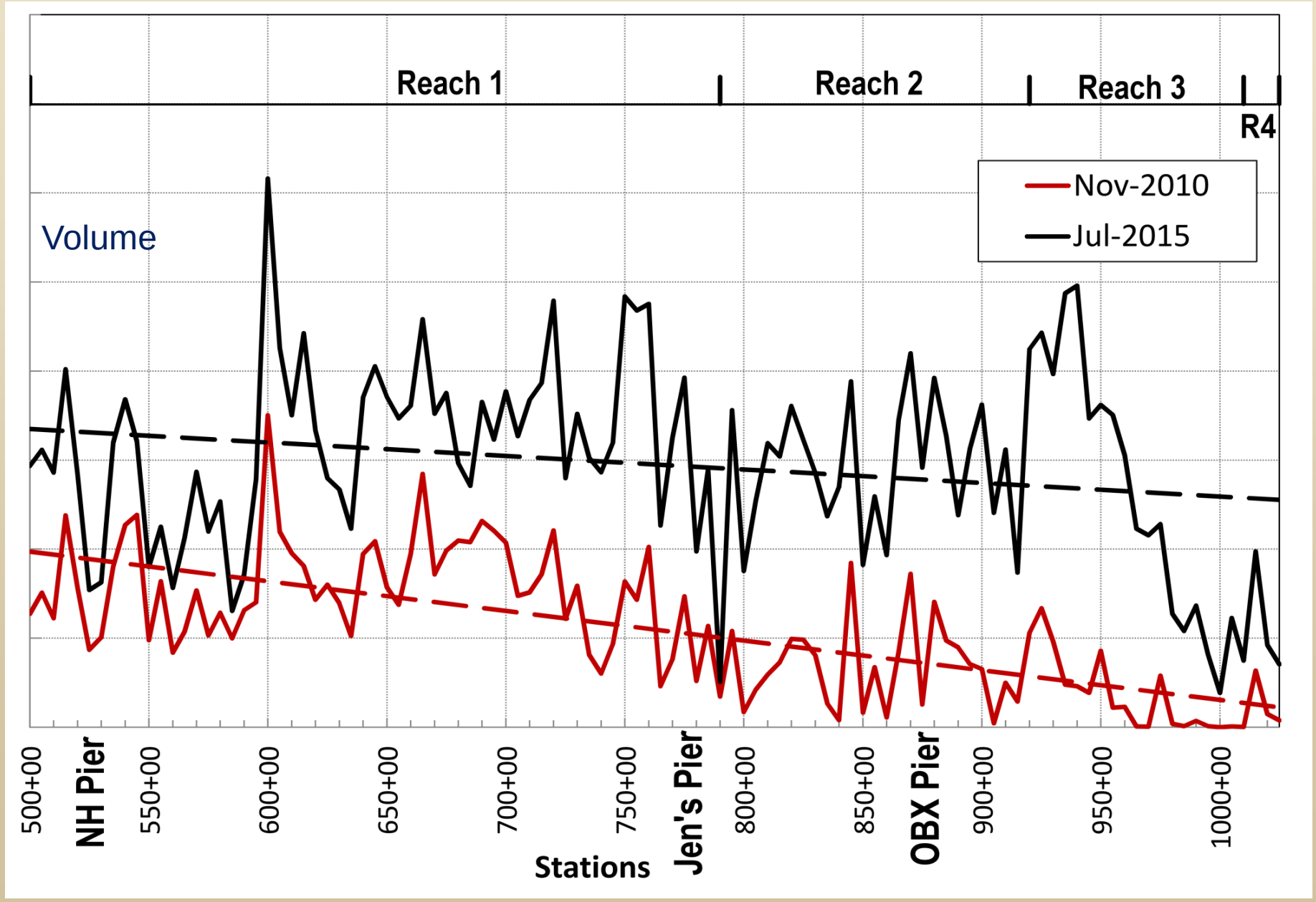
Natural Growth of Dune



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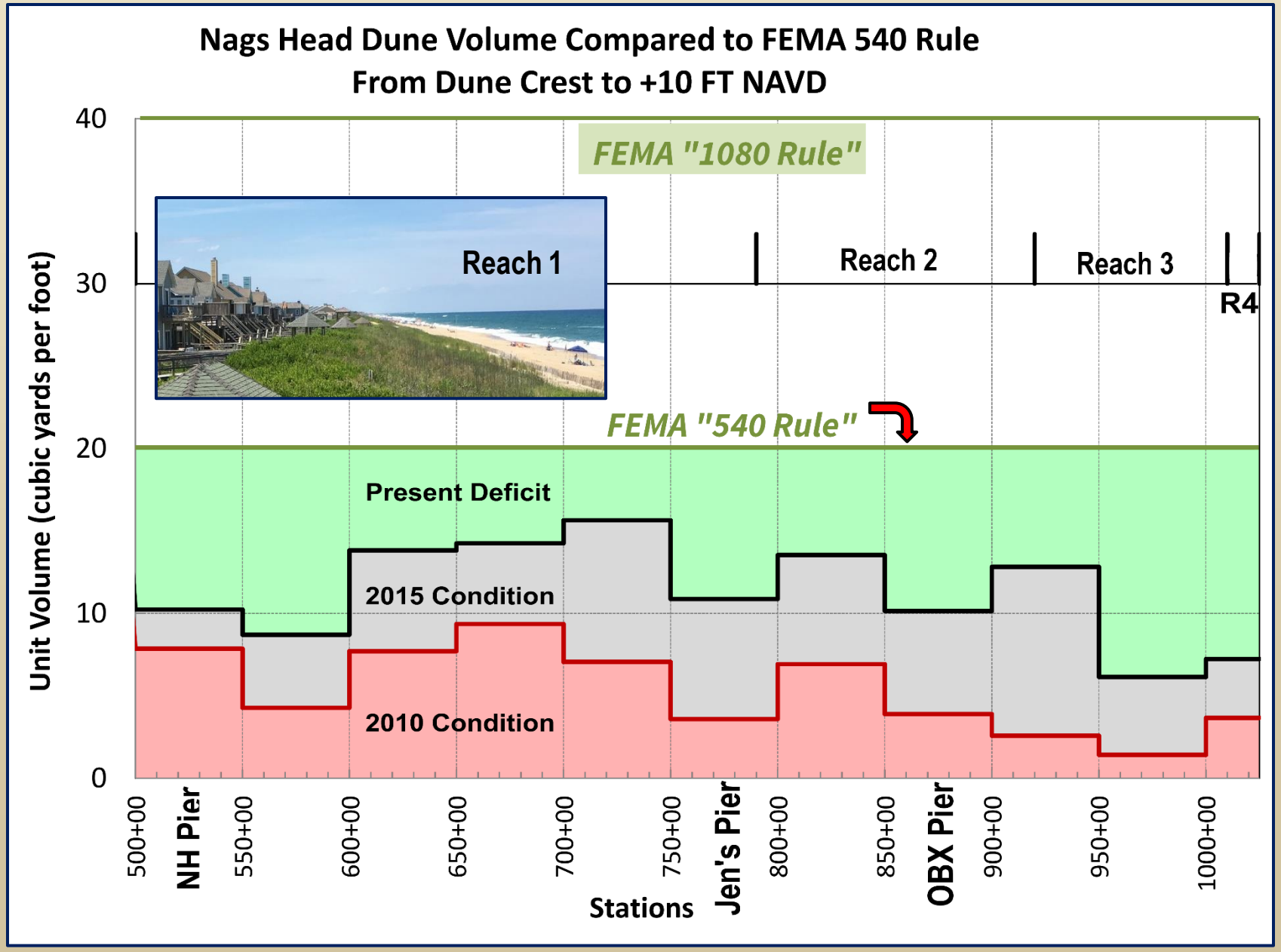
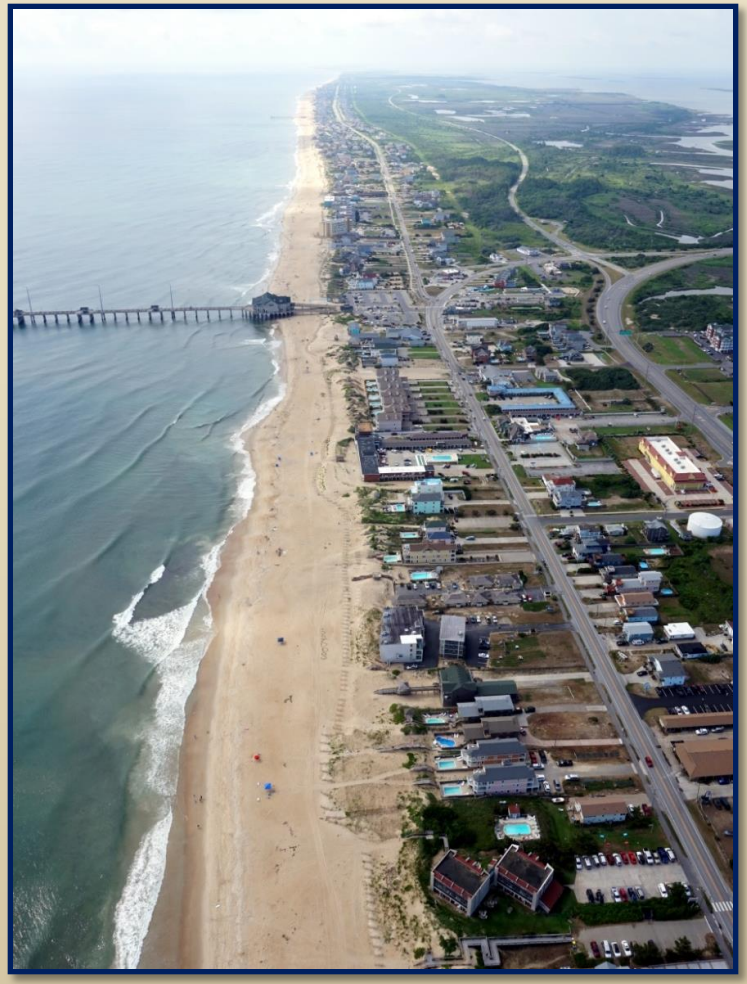
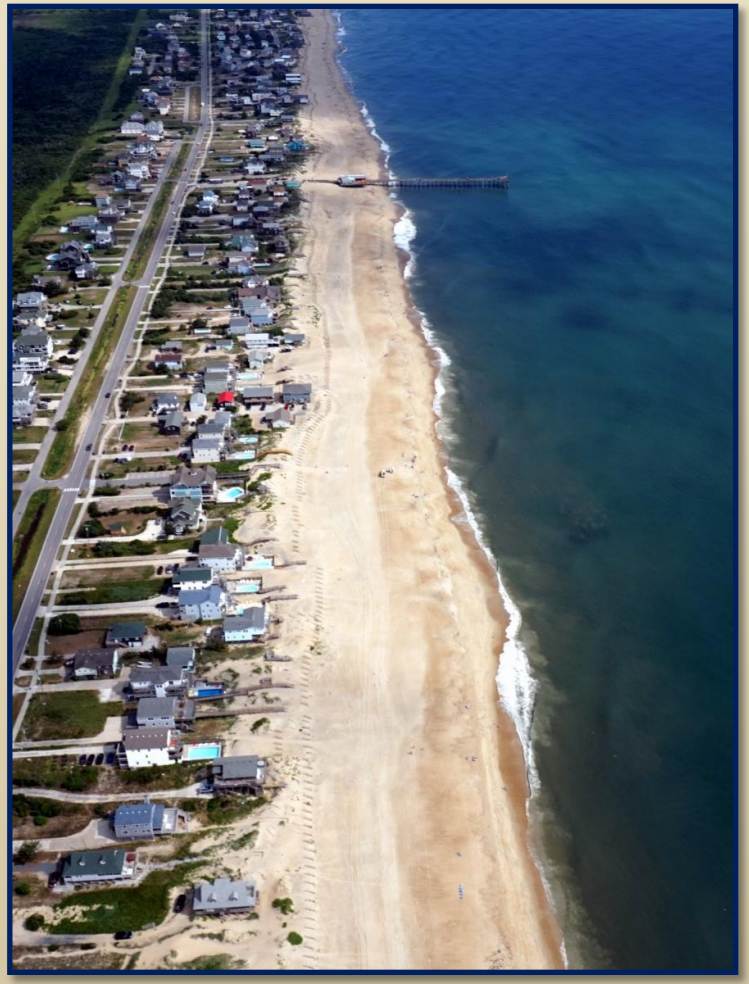


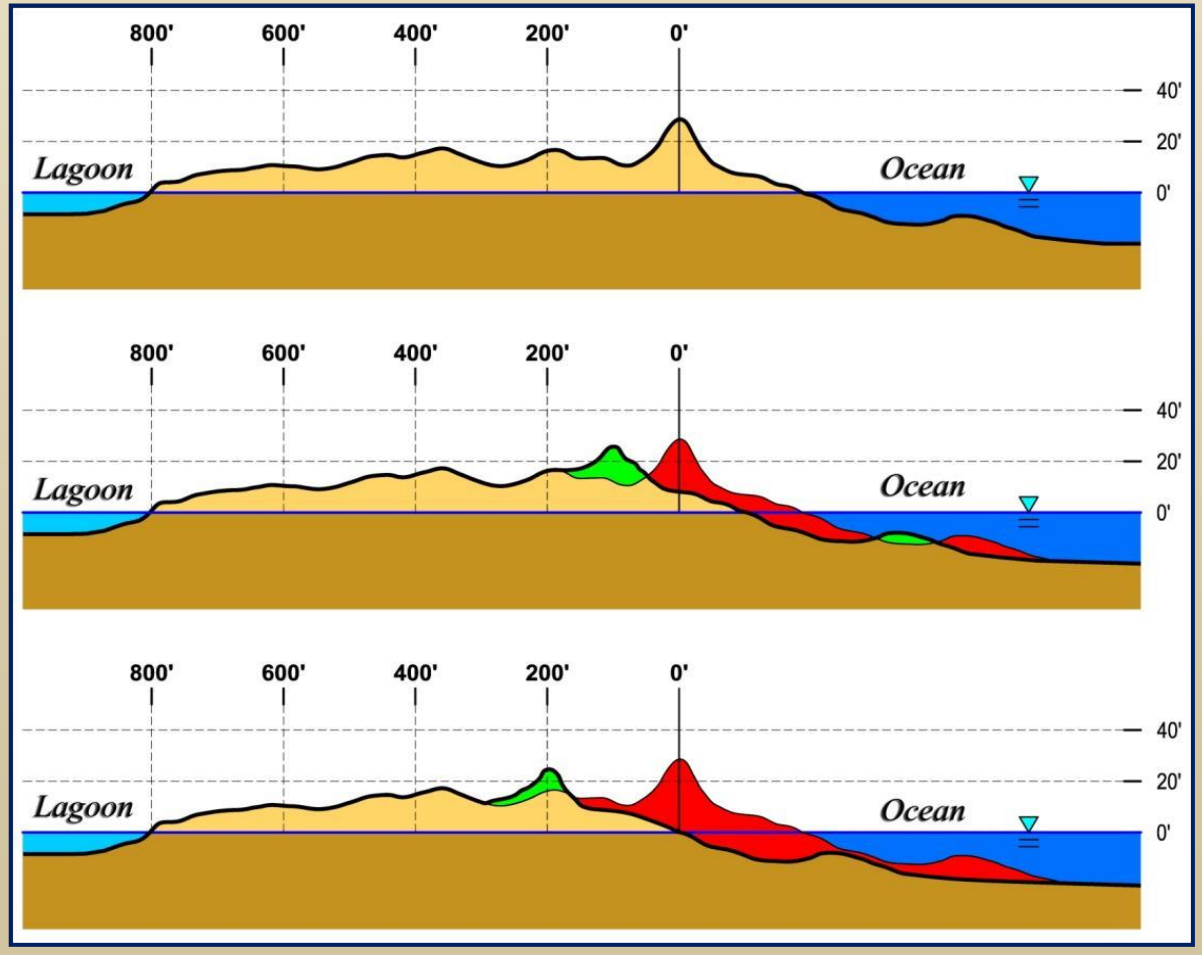


Nags Head at Jennett's Pier June 2015 looking southwest



South Nags Head near Outer Banks Pier June 2015 looking northeast

"The Essence of the Beach Restoration Debate is Whether to Allow Erosion to Proceed and Abandon Existing Homes, Businesses & Infrastructure or Replace the Lost Sand in the Red Zone." *CSE Primer 2011*



Nags Head Beach Width Before/After 2011 Project

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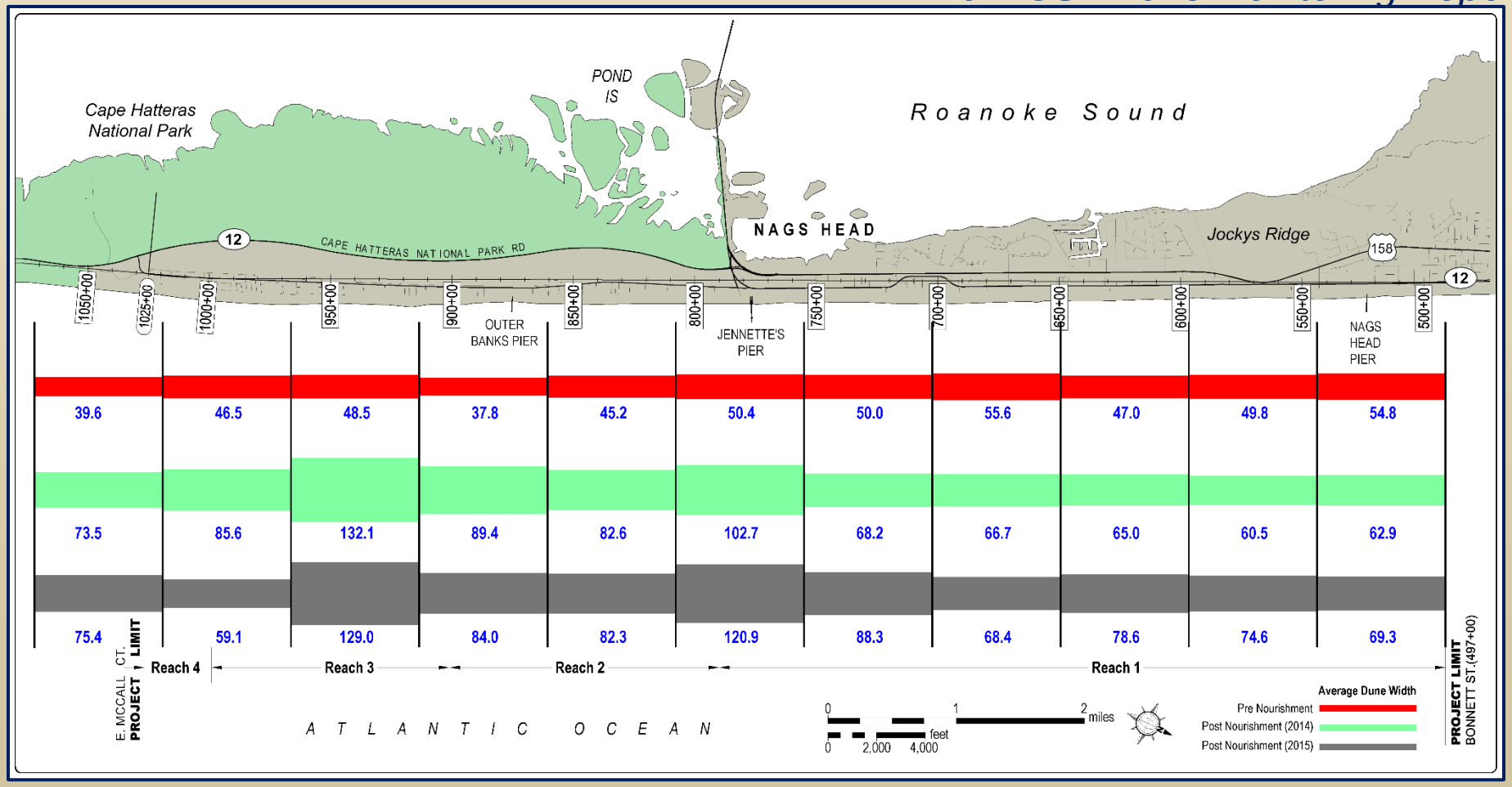

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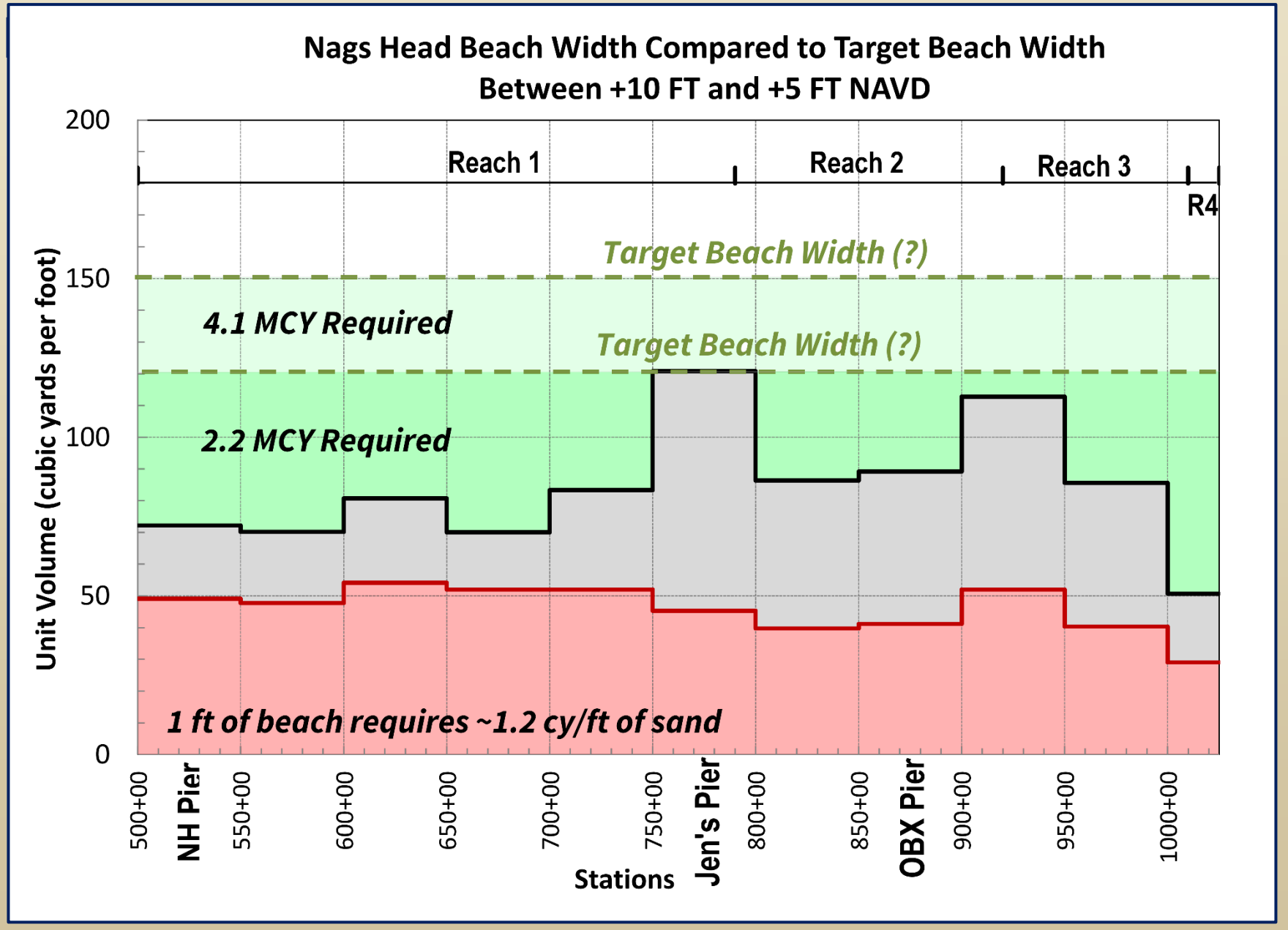

Part 3 – Work Progress and Path Forward for 2018 Re-nourishment

- Field work updates – borrow areas
- References for public access
- Determine project objectives and scale
- Initiate preliminary design and coastal engineering study
- Initiate permit liaison and document preparation

Discussion